

## On-farm examination of resistant early and maincrop potato varieties in Hungarian organic farming

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**Key words:** on-farm research, potato, organic farming, variety testing

### Abstract

*The Hungarian organic potato growers mainly relied on well-known conventional varieties under their organic cultivation, but these varieties are not always best suited for organic farming. Therefore, ÖMKi initiated a participatory research to test resistant potato varieties. Six Hungarian bred, disease resistant varieties were tested in 2012: Balatoni Rózsa, Démon, Hópehely, Katica, Vénusz Gold, White Lady, Desirée (as control). The best qualitative and quantitative performers, Balatoni Rózsa, Démon and Hópehely, were retested in 2013.*

*Overall conclusion is that the tested potato varieties are competitive and promising for Hungarian organic farming. The yield and the quality assessments showed good or acceptable results. The results and experience presented that the acceptability of potato varieties is worth to examine in on-farm research methodology: through the research practical information was given for the participants and information flow as well as cooperation were increased.*

### Introduction

Conditions in organic farming bring other challenges to seedstock breeders than seen in conventional farming. The different way of fertilization and reliance on contact-effect pesticides demands more disease tolerant or resistant varieties. The Hungarian organic potato grower mainly relied on well-known conventional varieties under their organic cultivation, but these varieties are not always best suited for organic farming. Therefore ÖMKi initiated a participatory-research (Baldwin 2004) to test resistant potato varieties, improve production technology, and facilitate the cooperation among the farmers and the sector's other stakeholders like advisors and breeders. This participatory research began in 2012 and continues in 2013 on three different subjects. In this paper a selection of important data is presented.

### Material and methods

12 certified organic farms joined the potato on-farm experimental network in the spring of 2012. Six, Hungarian bred, disease resistant varieties were tested in 2012: *Balatoni Rózsa*, *Démon*, *Hópehely*, *Katica*, *Vénusz Gold*, *White Lady* along with a control variety, *Desirée*. The participating farmers planted their tubers in April, the minimum size of the test plots was 12 m<sup>2</sup> for each variety. The individual farmers determined their own cultural methods. Quantitative and qualitative assessments were done after the harvest. The yield was measured in kg/m<sup>2</sup>. Samples of 50 tubers were taken from each test plot of each variety. We performed a visual inspection of the tubers' surface: we recorded infection by *Streptomyces*, *Rhizoctonia*, *Fusarium*, *Erwinia*; severe damage by animals, *Agriotes* larvae, machines; and those deformed or greened (Hooker 1981). Other problems affecting the potatoes were not included in the study data collection (nematodes, *Phytophthora*, *Helminthosporium* or interior problems).

Nine certified organic farms participated in the early potato on-farm experimental network in the spring of 2013. Based on the results of 2012, the best qualitative and quantitative performer was *Balatoni Rózsa* and was used as a control for testing additional two early varieties: *Ila* and *Pannónia*.

Unfavorable weather spring conditions delayed planting of the three early species until April. After harvest, qualitative and quantitative analysis was performed in the same manner as with the 2012 trials.

Besides the early variety trials, maincrop varieties, *Hópehely* and *Démon* are also were retested because of last year's results, but processing of 2013 data has not been completed as of the writing of this paper.

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## Results

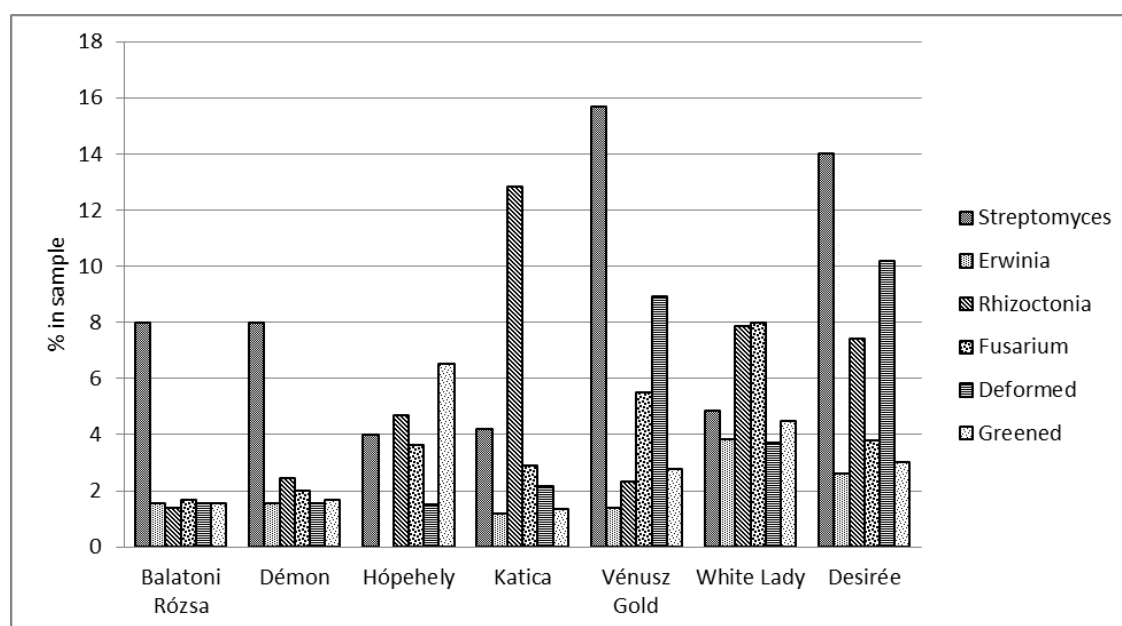
### Experiment of 2012

Average yields ( $\text{kg/m}^2$ ) of maincrop varieties in 2012 are presented in Table 1. Because of different growing conditions (different soils, irrigation methods and plant protection) the trends should be analyzed rather than the finer details. Based on the results, most of the examined varieties show competitive yields when compared to the control. Two redpeel varieties, *Balatoni Rózsa* and *Katica* showed the best overall results.

**Table 1: Average yields in maincrop potato on-farm experiment of 2012**

| Variety                   | Balatoni Rózsa | Démon | Hópehely | Katica | Vénusz Gold | White Lady | Desirée |
|---------------------------|----------------|-------|----------|--------|-------------|------------|---------|
| Yield ( $\text{kg/m}^2$ ) | 3,03           | 2,89  | 2,82     | 3,08   | 2,16        | 2,45       | 3,01    |

Figure 1. summarizes the variety specific quality assessment results in 2012. Among the redpeel varieties the early type *Balatoni Rózsa* and the maincrop type *Démon* were shown like to be least susceptible to six variety specific quality problems. In their case, the number of affected tubers in the samples -excluding *Streptomyces* symptoms- was below 2% on average.



**Figure 1. Variety specific results in the quality assessment; potato on-farm experiment of 2012.**

At the end of growing season a survey was made among the participating farmers. Table 2. shows the overall judgement of farmers about each varieties' attributes on a scale of 1-5 (average of 9 datasheets). The farmers are most satisfied with *Balatoni Rózsa*, *Démon*, *Katica* and *Hópehely* varieties, but the taste of *Desirée* is still favorable.

**Table 2: Overall judgement of farmers about tested varieties in 2012**

|                | Cultivation and harvest attributes | Yield and tuber visual attributes | Consumption and taste attributes | Willingness to coming year's cultivation |
|----------------|------------------------------------|-----------------------------------|----------------------------------|--|
| Balatoni Rózsa | 4,9                                | 5,0                               | 5,0                              | 9 yes                                    |
| Démon          | 4,3                                | 4,4                               | 4,2                              | 7 yes                                    |
| Hópehely       | 3,9                                | 3,9                               | 4,0                              | 7 yes                                    |
| Katica         | 4,4                                | 4,0                               | 4,2                              | 6 yes                                    |
| Vénusz Gold    | 3,6                                | 2,9                               | 3,3                              | 5 yes                                    |
| White Lady     | 3,9                                | 3,2                               | 4,0                              | 4 yes                                    |
| Desirée        | 3,8                                | 2,9                               | 4,4                              | 3 yes                                    |

### **Experiment of 2013**

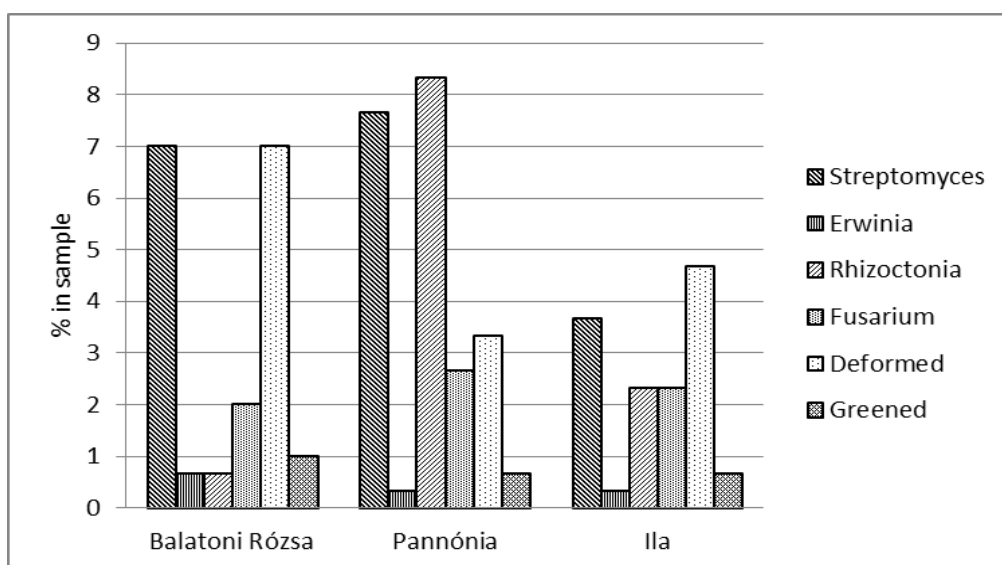
Table 3. shows the average yield of early variety trials in 2013. Among the three varieties the *Balatoni Rózsa* showed the highest average weight.

**Table 3: Average yields in early potato on-farm experiment of 2013**

| Variety                    | Balatoni Rózsa | Pannónia | Ila  |
|----------------------------|----------------|----------|------|
| Yield (kg/m <sup>2</sup> ) | 2,98           | 2,28     | 2,33 |

Figure 2. summarizes variety specific results in the early variety quality assessment for 2013. Looking at the six variety specific results, *Ila* performed the best, while control variety *Balatoni Rózsa* reached the second place. The *Streptomyces* symptom is still the most frequent problem, but in early growing conditions appear less infected tubers than in midseason growing (compared to 2012 data).

The participating farmers agree that repetition of the early variety trial is necessary in 2014 using a fleece covering. Based on field experiences, potatoes cultivated under the fleece covering redound earlier, producing larger yields with better tuber quality.



**Figure 2: Early variety specific results in the quality assessment; potato on-farm experiment of 2013.**

At the end of growing season same survey was made among the participating farmers as in 2012. Table 4. shows the overall judgement of farmers about each varieties' attributes on a scale of 1-5 (average of 11 datasheets). The farmers are most satisfied again with *Balatoni Rózsa*, but the yellow peeled Pannónia was also popular. In spite of good yield and taste attributes, just few of the farmers would grow Ila again because of its too many small tubers.

**Table 4: Overall judgement of farmers about tested early varieties in 2013**

|                | Cultivation and harvest attributes | Yield and tuber visual attributes | Consumption and taste attributes | Willingness to coming year's cultivation |
|----------------|------------------------------------|-----------------------------------|----------------------------------|--|
| Balatoni Rózsa | 4,59                               | 4,59                              | 4,88                             | 11 yes                                   |
| Pannónia       | 4,14                               | 4,09                              | 4,13                             | 9 yes                                    |
| Ila            | 4,09                               | 3,35                              | 4,17                             | 3 yes                                    |

## Discussion

Overall conclusion is that the tested potato varieties are competitive compared to the control variety for Hungarian eco farming. Although hence of dry growing season the resistance against late blight could not be tested, the quality assessments showed good or acceptable results in case of variety specific quality results. The average yield was also good or acceptable in case of the most tested varieties, although the reachable maximum was mostly depending on the circumstances of each farm.

The experience proves that the acceptability of potato varieties is worth to examine in on-farm research methodology: results, received from different conditions and cultivation technologies, show the reachable characteristics of varieties in conditions of organic farming. Participants receive instant practical information through the on-farm participatory research. During the 2-years-program several meetings were organized, which have increased information flow and cooperation.

## References

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